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(54) A PROCESS FOR REDUCING THE FRICTION BETWEEN A THREAD AND THREAD GUIDE PARTS OF TEXTILE MACHINES

(71) I, KARL ISAC JOEL ROSEN, a Swedish Subject, of Villa Haga, S-52300 Ulricehamn, Sweden, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a method of feeding thread from a supply source to an operating point on a textile machine.

In the case of textile machines, it is frequently necessary to move the thread issuing from a bobbin through a plurality of guide parts such as thread eyes and guide elements. The sum of the individual frictional forces results in a large frictional force and high tension is produced in the thread in overcoming this force. This leads on the one hand to the danger of the thread breaking and, on the other hand, frequently impairs the appearance or design of the textile goods to be produced.

Up to the present, attempts have been made to reduce the friction between the thread and the thread guide parts by oiling or by coating the thread with paraffin. Disregarding the fact that this additional treatment of the thread is expensive, the friction can only be reduced in this manner by a limited amount. Hence, attempts have also been made to impart rapid oscillation movements to the thread guide parts so as to interrupt the contact between the thread and thread guide parts at a high frequency. This, however, necessitates very considerable constructional costs, since a plurality of thread guide parts must be oscillated or vibrated.

The object of the invention is to provide a method of feeding thread in which the friction between the thread and the thread guide parts of textile machines can be reduced while keeping additional constructional costs as low as possible.

According to the invention there is provided a method of feeding thread from a supply source to an operating point on a textile machine in which the thread is tangentially wound on to a storage member and is axially withdrawn from the storage member under a brake ring and passed to the operating point through a plurality of guide parts, which would normally apply frictional forces to the thread, wherein at least one of the adjacent surfaces of the brake ring or storage member against which the thread acts is formed with continuous irregularities adapted to impart vibrations in the thread as it passes for the purposes of reducing such frictional forces.

Preferably the brake ring comprises an annular base which surrounds the storage member in spaced relation therewith and resilient fingers or spokes which are distributed over the circumference of the base with intermediate spaces, and which extend from the base toward the adjacent storage member surface and are obliquely directed both in respect of the axis and circumference of the storage member in the directional sense of thread withdrawal the free ends of the fingers or spokes making contact with the storage member, so that vibrations are generated in the thread as it slides over the fingers or spokes.

In the preferred method in accordance with the invention, a high frequency vibration is produced by pulling the thread over a plurality of resilient fingers. This vibration surprisingly reduces the friction between the thread and the stationary thread guide parts to a minimum. The tension variation and the frequency of the vibrations can be readily determined such that the vibrations do not impair the appearance of the textile goods to be produced. By employing the method in accordance with the invention, the occurrence of dropped loops could be completely eliminated when knitting goods with the frequent formation of dropped loops.

The method of the invention will now be described in more detail with reference to an embodiment of a device suited to carry out this process.

In the drawing:

Figure 1 is a side elevation of a device for executing the process in accordance with the invention,

Figure 2 is a side elevation, and

Figure 3 is a top elevation of a braking ring for the device in accordance with Figure 1.

In Figure 1, a bobbin 2 is disposed on a support arm 1 which is connected in a manner not illustrated to the frame of the textile machine to be supplied with thread. A thread 3 is tangentially conducted to a drum 8 through a number of thread guide elements 4, 5, 6 and 7. The drum 8 is rotatably journalled in the support arm 1 and is driven in rotational movement by a motor (not shown). By rotating the drum 8 a thread storage 3*a* is formed thereupon which may be one or more layers thick. This storage is transported downwardly in axial direction of the drum 8 by known means (not shown). The size of this thread storage is maintained within predetermined limits in the case of intermittent thread withdrawal by the textile machine in accordance with the demand of the machine. The means to this end are also known in technology. In the case of positive thread feed (where the thread is removed tangentially), the amount of the thread reservoir does not normally need to be monitored.

The thread, in the form of an unwinding thread portion 3*b*, is unwound from the drum 8 axially through a thread eye 9 which is aligned with the axis of the drum 8 and is conducted to the textile machine (not shown) via thread guide parts indicated at 14*a*—*d*.

In order to attain a certain amount of minimum tension in the unwinding thread portion 3*b* on the one hand, and on the other hand, to reduce the friction between the thread portion 3*b* and the thread guide parts 9, 14*a*—*d* in particular, a braking ring is provided which is generally indicated by 10 and which surrounds the circumference of the drum 8. This braking ring in the illustrated embodiment integrally consists of plastics and has a base ring 11 as well as resilient fingers 12 which proceed therefrom. The base ring 11 encompasses the circumference of the drum 8 with an intermediate spacing *a*. The free ends of the fingers 12 rest on a shoulder 13 which is beveled in the direction of the unwinding thread in the manner illustrated and which is positioned at the lower edge of the drum 8.

The details of the braking ring 10 can be seen from Figures 2 and 3. The fingers 12, which protrude from the base ring 11 in the direction of the unwinding thread in the installed state, extend along an imaginary conical surface K whose apex angle *s* amounts to 60° in the case of the illustrated embodiment. The fingers 12 are disposed in an inclined position relative to the drum 8 in the direction of the relative course U of the thread. The angle of inclination with respect to the tangents on the circumference of the base ring 11 lies between about 10 and 20°. As can be clearly seen in Figures 2 and 3, the fingers 12 are dimensioned and arranged such that they overlap each other to a considerable extent in the circumferential direction. They are approximately 1—2 mm long. The thickness thereof lies in the magnitude of 0.5—1 mm according to the material used. The intermediate spacings between the fingers amount to about twice to four times the finger thickness measured in the circumferential direction of the base ring 11. It can also be clearly seen from the drawing that the fingers 12 are spacially twisted in the shape of a spiral. The fingers 12 are positioned so densely that 1—5, preferably 1.5—2.8, fingers fall on every centimeter along the circumfence of the base ring 11.

When the thread portion 3*b* unwinds, the thread slides along the resilient fingers 12 and bends them somewhat to one side in the circumferential direction U, thereby causing the thread to penetrate into the intermediate spaces between the fingers by virtue of centrifugal force so that the thread is primarily in contact only with the fingers. The bending resistance of the fingers is all the greater the closer the thread lies to the roots of the fingers. When the fingers are bent laterally by the thread, the thread initially abuts closer to the root and then slides toward the apex to re-engage closer to the root of the adjacent finger when it leaves the apex. This results in slight variation in tension amounting to ± 0.25 to ± 0.6 g which do not impair the appearance of the goods to be produced in the textile machine. The frequency of these variations in tension lie in the magnitude between 900 to 1700 cps at thread speeds between 200 m/min to 350 m/min. These tension variations eliminate the friction between the thread portion 3*b* and the thread guide elements 9, 14*a*—*d* almost completely.

The base diameter D of the fingers 12 is measured and designed such that the cited intermediate space *a* remains between the base ring 11 and the circumference of the storage drum 8. The diameter *d* of the circle on which the free ends of the fingers 12 lie is expediently calculated such that it is somewhat smaller than the diameter of the drum 8 in order that the fingers 12 abut on the drum circumference under pressure.

Polyamide proved to be a useful material for the braking ring 10.

The invention is not limited to the embodiment shown in the drawing. Particularly the dimensions of the individual braking ring parts and the various angles at which the fingers 12 extend may be adapted to the respective requirements. The thickness of the fingers can also be selected in each case such that the desired minimal friction in the thread

guide parts is guaranteed. Furthermore, a drum can of course also be employed upon which the thread is wound up by means of a rotating winding element.

It will be apparent that the irregularities causing vibration of the thread may be formed in other ways. For example, the shoulder of the drum may be formed with undulations over which the thread passes, the brake ring being lightly resilient, e.g. of stretchable fabric so as to hold the thread against the shoulder.

Reference is directed in pursuance of Section 9, subsection (1) of the Patents Act 1949, to my Patent No. 1,241,781.

WHAT I CLAIM IS:—

1. A method of feeding thread from a supply source to an operating point on a textile machine in which the thread is tangentially wound on to a storage member and is axially withdrawn from the storage member under a brake ring and passed to the operating point through a plurality of guide parts, which would normally apply frictional forces to the thread, wherein at least one of the adjacent surfaces of the brake ring or storage member against which the thread acts is formed with continuous irregularities adapted to impart vibrations in the thread as it passes for the purpose of reducing such frictional forces.

2. A method as claimed in claim 1 wherein the brake ring comprises an annular base which surrounds the storage member in spaced relation therewith and resilient fingers or spokes which are distributed over the circumference of the base with intermediate spaces, and which extend from the base toward the adjacent storage member surface and are obliquely directed both in respect of the axis and circumference of the storage member in the directional sense of thread withdrawal the free ends of the fingers or spokes making contact with the storage member, so that vibrations are generated in the thread as it slides over the fingers or spokes.

3. A method as claimed in claim 2 in which the fingers or spokes extend so as to lie on an imaginary conical surface.

4. A method as claimed in claim 3 wherein the said cone has an apex angle of substantially 60°.

5. A method as claimed in claim 2 or claim 3 or claim 4 wherein a brake ring is used which is integrally formed of plastics material by injection moulding.

6. A method as claimed in any of claims 2 to 5 wherein a brake ring is used in which the inner ends of the fingers or spokes lie on a circle whose diameter, when the brake ring is removed from the storage member, is smaller than the diameter of the storage member.

7. A method as claimed in any of claims 2 to 6 in which a brake ring is used which has 1—5 fingers or spokes per centimeter of base circumference.

8. A method as claimed in claim 7 in which a braking ring is used which has 1.5 to 2.8 fingers or spokes per centimeter of base circumference.

9. A method as claimed in claim 1 wherein a shoulder of the storage member under the brake ring is formed with undulations.

10. A method as claimed in claim 1 substantially as described herein with reference to the accompanying drawings.

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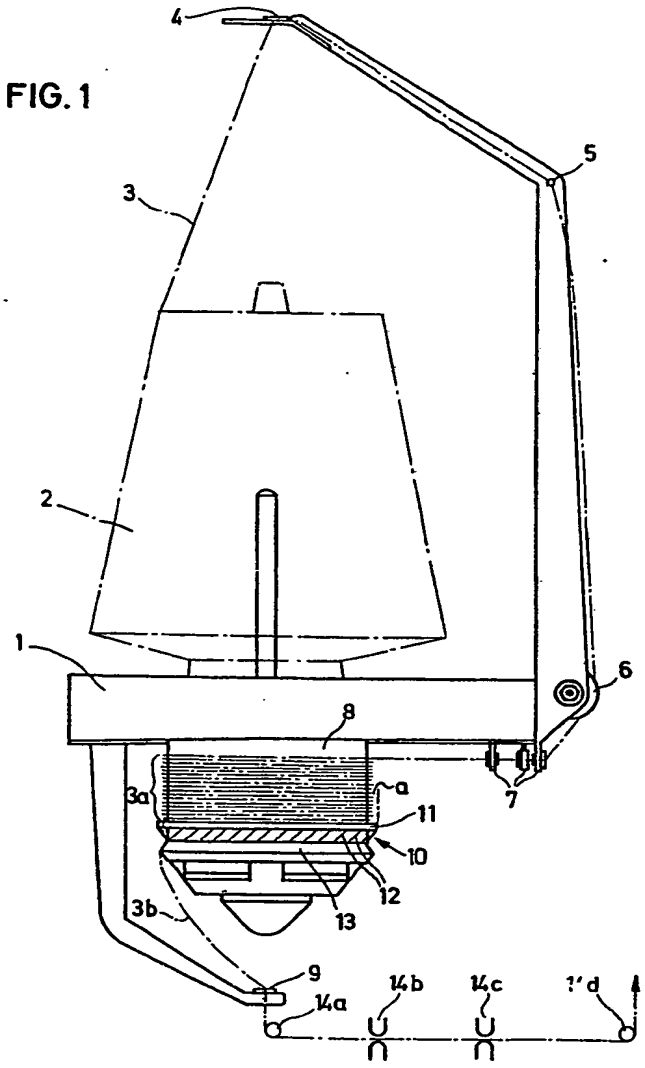
2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 1

FIG. 1



1375589 COMPLETE SPECIFICATION
2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 2

FIG. 2

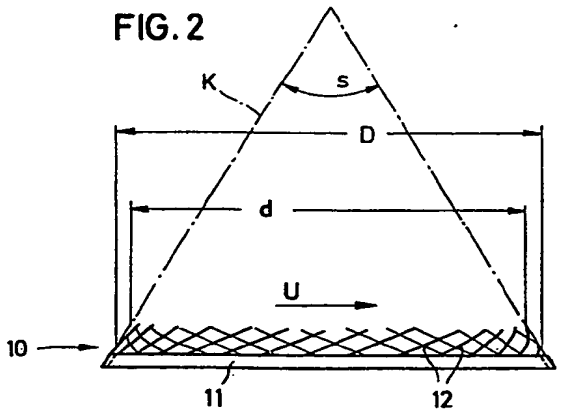


FIG. 3